SECTION 6

Monitoring

This section includes information on the following required element:

> **Element 5:** This element requires descriptions of the proposed plans for monitoring species and their habitats identified in the 1st element, for monitoring the effectiveness of conservation actions proposed in the 4th element, and for adapting these conservation actions to respond appropriately to new information or changing conditions.

6.1 Introduction

This section describes the process of adaptive management, a synopsis of habitat and species monitoring efforts, and opportunities for storing data that will be collected or compiled through implementation of the CWCS. These monitoring components complement each other and will provide a more comprehensive assessment of the efficacy of the CWCS.

Developing a multifaceted statewide monitoring program has many challenges. North Dakota is a large state of roughly 45 million acres, with about 90% held in private ownership. Approximately 600 species of vertebrates spend at least a portion of their life cycle within this geographic area. Roughly 120 - 150 of these species (largely game species) have varying degrees of monitoring or survey work conducted on them by several agencies. The two principal agencies that conduct the majority of that monitoring are the NDGFD and the USFWS. The USFS, USACOE, USNPS and various universities conduct lesser amounts.

A large number of the remaining 450 species receive considerably less monitoring. Most surveys conducted for these species are somewhat disjointed and/or are secondary in terms of monitoring objectives. A shortage of resources frequently limits the degree and scope of surveys which are initiated. In some instances, volunteers or private citizens with bird watching or similar interests carry out monitoring efforts. For example, each year the USGS coordinates an annual Breeding Bird Survey and the National Audubon Society coordinates a Christmas Bird Count; both are conducted entirely by volunteers. Other examples include reptile and amphibian inventories on national parks and grassland bird surveys on fish and wildlife refuges.

There is no existing framework that can be easily modified to implement a monitoring plan for all of the state's indigenous species and their habitats. Developing a monitoring plan for North Dakota's SoCP and Landscape Components will require a multifaceted approach that includes but is not limited to amalgamating the information from existing monitoring efforts to create a central reporting system and repository, modifying or expanding current surveys to include species of conservation priority where feasible, creating an incidental reporting system for the public, and implementing new monitoring efforts.

Perhaps most important to developing a statewide monitoring plan is pooling or sharing past, present and future survey information collected in North Dakota by land management agencies, universities, non-government organizations, the general public, etc. Individually these monitoring efforts are somewhat small, infrequent, and often conducted on a local spatial scale (e.g. refuge or park). However, when information from these surveys is viewed collectively, or in conjunction with other surveys over time, meaningful presence, absence, range and distribution data can be generated. It is clear there will be a need to work cooperatively with these agencies to coordinate monitoring efforts.

6.2 Adaptive Management

Adaptive management (Hollings 1987) is an iterative process to improve the speed with which we learn, and incorporate that learning into management and planning. Adoption of adaptive management inherently makes the leap from implicit uncertainty in the knowledge of the systems under management, to explicit acknowledgement of key uncertainties about systems and management of those systems. Identifying and reducing the number of key uncertainties becomes an objective of system management.

There are several requirements or steps to building and adopting an adaptive management system. They are:

- Managers include scientists and stakeholders in planning of programs and developing of measures of effectiveness. In so doing three key elements are identified:
    - Measurable indicators of system responses to management alternatives.
    - Policies, programs or activities that will affect the system.
    - Ecological processes that link management actions to changes in the measurable indicators.
- Develop tools to predict outcomes from a suite of management alternatives.
- Identify key uncertainties in the system.
- Develop and implement management actions.
- Monitor indicators or proxies for responses to management actions.
- Evaluate information gathered during monitoring. This process includes reporting of consequences, development of recommendations to the management and stakeholders, and further refinement of key uncertainties and measurable indicators.
- Re-evaluation of management plans, programs or actions with stakeholders and scientists and making adjustments (if necessary).

Objectives: The objectives of the NDGFD monitoring program are:

1. To assist in establishing scientifically based priorities for allocating limited resources.
2. Provide information and develop tools to assist management in decision making and planning.
3. To increase our ecological understanding of species and their habitats.
4. Provide data to identify and evaluate the effects of management actions and programs.

These objectives are consistent with the tenets of adaptive management, which is a system of improved management by design. Adopting an approach of proactive and flexible management is critical to the success of NDGFD's CWCS. Functionally, managers have always adapted programs to better meet the department's objectives. NDGFD expects that use of an adaptive management system for monitoring species and their habitats will lead to more effective management of fish and wildlife resources. Figure 12 depicts the adaptive management conceptual process.

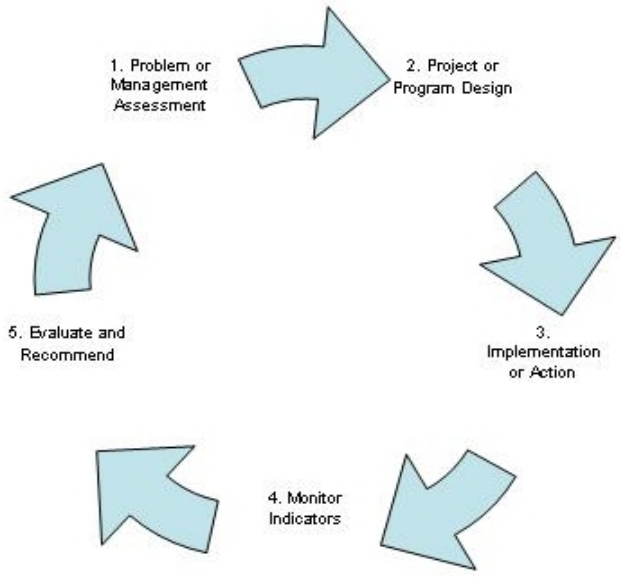

Figure 12. The Adaptive Management Process, conceptual view as described in Nyberg (1998).

This process is best suited for selecting between or prioritizing management actions. The elements of adaptive management will be addressed under three headings: Planning; Implementation; and Monitoring and Evaluation. Planning includes setting objectives, identifying key uncertainties, identifying indicators and formulating models. Implementation is where plans become action at the habitat and species level. Monitoring can happen at two levels, either species or habitat measurements. The monitoring focus is

determined by objective, ability and practicality.

6.2.a Planning

NDGFD has an array of resources to incorporate into the planning process. These include, but are not limited, to USGS research staff, USFWS Habitat and Population Evaluation Team scientists, private research foundations, university researchers, USFS staff, USNPS staff, and USFWS refuge staff, and others. These experts all have extensive knowledge and are involved with existing monitoring programs that can contribute to the overall wildlife planning community. Existing programs will be discussed in Section 6.3.

A series of annual workshops involving both terrestrial and aquatic experts were initiated in 2004. These meetings included private, state, federal and academic experts in wildlife research and natural resource management. Based on open discussions, priorities and uncertainties were identified and discussed at both the species and habitat level. Conservation actions were reviewed, with a focus on the ability to evaluate and perhaps model those actions. Objectives have been set and requests issued for proposals addressing the objectives. The scientific community then responds. Research scientists identify indicators or proxies that may be used to address information needs. Respondents to the RFPs propose methods to accumulate relevant information to model and test selected objectives. Biologists and management staff from NDGFD evaluate the proposals and rank them based on a variety of parameters, and allocate limited resources accordingly. NDGFD recognizes that the complexity of information required to address adaptive management models for all species and habitats statewide does not exist. Through the expert workshops and CWCS planning process, NDGFD has amalgamated the information from all partners, as well as identified information that is lacking, and will develop monitoring plans. Through this process the goal is to develop both qualitative and quantitative aspects of monitoring species and their habitats.

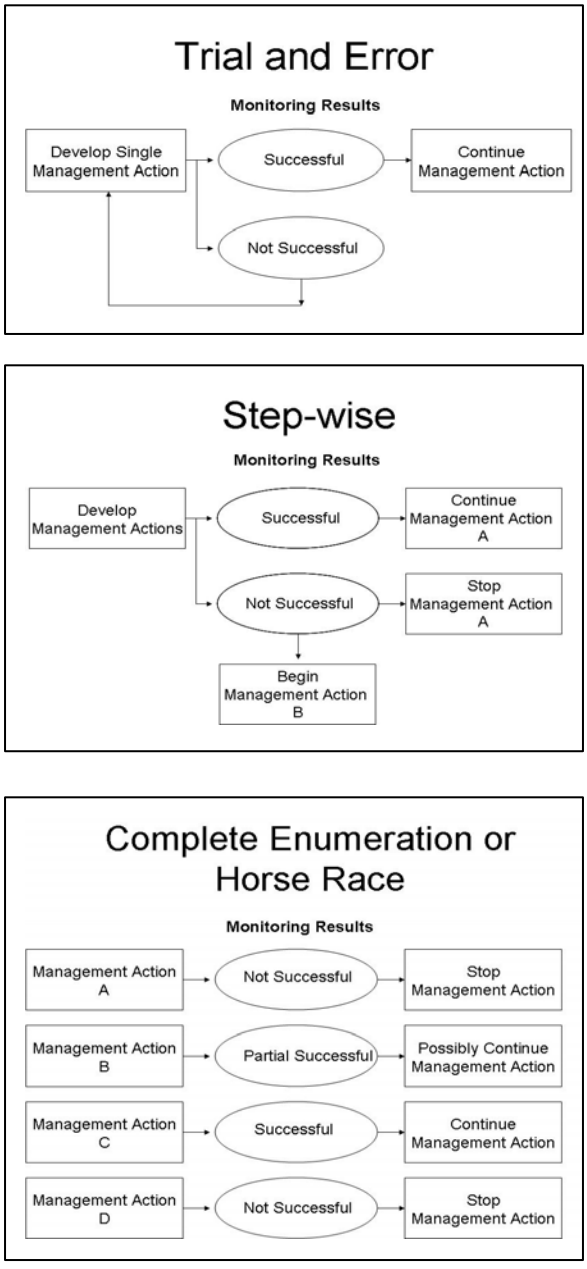

Figure 13. Visual depictions of Learning by Design.

6.2.b Implementation

Implementation involves following through with management and conservation actions on the landscape. From workshop and management planning efforts, either a single or suite of management actions will be developed. In a learning-modeling framework there are 3 ways to approach management alternatives. Each has differing costs in both time and money. These approaches are Trial and Error, Step-wise, and Complete Enumeration or the Horse Race approach (see Figure 13). Trial and Error is a single step approach that is usually the least expensive method but can take substantially longer to evaluate programs with many alternatives for delivery. Step-wise is similar in cost to Trial and Error, but can switch to an alternative without revisiting the planning process. Time is saved and monetary costs include the additional planning for alternatives. The Horse Race is the most efficient way

to compare a suite of alternatives, but it can be prohibitive to implement and monitor all reasonable alternatives simultaneously. The approach best suited for each individual program or action will be used depending on logistics and budgets.

Single species management for wildlife planning, such as raptor recovery or stocking type efforts, is rare and expensive. Management action usually involves providing for or protecting habitat necessary to the life cycle of one or more species of concern. Understanding habitat associations, and species response to habitat manipulation, becomes crucial to the evaluation of program delivery. As implementation actions are defined, so too must mechanisms for measuring habitat capacity and/or species response. The NDGFD will work from existing literature or expert opinions and workshops, to identify mechanisms for measuring the success of specific conservation actions.

6.2.c Monitoring and Evaluation

Monitoring is incomplete without evaluation. Monitoring is discussed here in the context that it leads toward evaluation, and is not solely the "collection of data." Monitoring as a part of the adaptive management process is the periodic collection of data to be analyzed for the purpose of informing management on the efficacy of a program. Specifically, when possible, NDGFD is addressing the question, "Is/Are the management action/s having the intended species or habitat response?" The answers to this question are vital to the evolution of both science and management. NDGFD takes the view that monitoring should be designed to understand species or their habitats in a way that contributes to the ability to manage or benefit populations. Where information is lacking, it is necessary to develop demographic, range, population, and species habitat use information to begin the process of informed management planning.

6.3 Habitat and Species Monitoring

6.3.a Habitat Monitoring

Section 5 detailed nine major landscape components in North Dakota. Landscape components are large scale ecological features. Habitats are unique areas or a particular environment where an organism prefers to live within the Landscape Components. North Dakota has a diversity of habitat types and conditions. Quantity and quality of habitat in relation to the larger landscape, climate, land use practices such as grazing or fire, and various other biotic and abiotic factors will affect species' use of habitat. Various recent monitoring efforts focus on condition, quantity and quality of various habitats or landscapes. Most of these efforts are conducted by state and federal agencies. The following are examples of habitat monitoring that incorporate issues of scale and condition to track habitat quantity and quality over time at varying geographic scales. The NDGFD will use these monitoring efforts to assess changes in surveyed habitat.

- Four-Square-Mile Survey: In 1987, the USFWS initiated a survey to annually measure wetland habitat conditions and assess habitat use and productivity of waterfowl populations. This survey was developed by statisticians and biologists from Northern Prairie Wildlife Research Center and is administered and conducted in conjunction with USFWS HAPET offices. Conducted annually in a sub-sample of 500 four-square mile plots throughout the Prairie Pothole Region of the U.S. (estimated 150-200 in North Dakota), the condition of habitat (e.g. wetland status, grassland, CRP) is documented in addition to waterfowl census. This effort attains habitat quantity, quality, and use information.
- Waterfowl Breeding Population and Habitat Survey for South and North Dakota: This aerial survey conducted in May of each year provides an overview of general waterfowl breeding population and climate conditions for most of North Dakota. The habitat information helps biologists make predictions as to the year's waterfowl production, but could be utilized to make inferences of breeding habitat quantity and quality for other wetland associated birds. The number of wetlands and conditions (e.g. poor, good) are documented. This effort attains habitat quantity and quality information along with population estimates.

- Ducks Unlimited - Grassland Loss of the Missouri Coteau: Ducks Unlimited is collecting satellite imagery over several time periods for the Missouri Coteau of North and South Dakota. Using GIS to analyze native prairie loss over time, Ducks Unlimited is attempting to determine what makes a prairie more susceptible to conversion to cropland. This effort will quantitatively estimate the amount of native prairie remaining in the Missouri Coteau. It will provide a model to predict which native prairie tracts are most vulnerable to conversion and therefore of high priority for protection. This effort attains habitat quantity information.
- US Forest Service Land and Resource Monitoring: The USFS conducts a variety of habitat monitoring efforts on the Little Missouri National Grasslands, Sheyenne National Grasslands, and Cedar River National Grasslands (collectively known as Dakota Prairie Grasslands) in North Dakota. Woody draw habitat trends in the badlands, Visual Obstruction Readings (VOR), and similarity index for seral state determinations (Floristic Quality Index) are just a few examples of habitat condition monitoring the USFS conducts. This effort attains habitat quality information.
- North Dakota Forest Health - ND Forest Service: Through a cooperative agreement with the North Dakota Forest Service, North Dakota State University Extension Service, NDSU Department of Plant Pathology, and Department of Plant Sciences, a forest health specialist has been funded for North Dakota to coordinate and direct forest health monitoring and management throughout the state. This involves; conducting insect and disease surveys, providing educational outreach, and delivering training and technical assistance to natural resource professionals. This effort attains habitat quality information.
  http://www.ndsu.nodak.edu/ndsu/lbakken/forest/sustain/doc/2001 2002_forest_health_report.pdf
- North Central Research Station's Forest Inventory and Analysis (NCFIA) - US Forest Service: According to the USFS website "The Forest Inventory and Analysis (FIA) collects, analyzes, and reports information on the status and trends of America's forests: how much forest exists, where it exists, who owns it, and how it is changing. The North Central unit is responsible for inventorying more than 82 million acres of forest land spread across 11 Midwestern States, including North Dakota. This information can be used in many ways, such as in evaluating wildlife habitat conditions, assessing the sustainability of ecosystem management practices, and supporting planning and decision-making activities undertaken by public and private enterprises. The FIA Program combines this information with related data on insects, diseases, and other types of forest damages and stressors to assess the health, condition, and potential future risks to forests. The forest monitoring component is the best known component of the FIA program. This component consists of a three stage systematic sample of sites across all forested lands of the U.S. Phase 1 consists of remote sensing for stratification, to identify where the forested land is. Phase 2 consists of one field sample site for every 6,000 acres of forest, where field crews collect data on forest type, site attributes, tree species, tree size, and overall tree condition. Phase 3 consists of a subset of Phase 2 sample plots which are measured for a broader suite of forest health attributes including tree crown conditions, lichen community composition, understory vegetation, down woody debris, and soil attributes. Soil samples are sent to a laboratory for chemical analysis. Finally, an associated sample scheme exists to detect cases of ozone damage occurring to adjacent forest vegetation." As of 2005, Phase 1 has been completed for North Dakota and Phase 2 and 3 are ongoing. This effort attains habitat quantity and quality information.
  http://ncrs.fs.fed.us/4801/
  http://fia.fs.fed.us/
- Bioassessment Programs – ND Department of Health:
  - Red River Basin Bioassessment Project: The primary goals of the Red River Basin Bioassessment Project are to: 1) assess, using biological, physical, and chemical data, the current biological condition of perennial, wadeable rivers and streams; 2) assess the current status of aquatic life use attainment of the perennial, wadeable streams of the Red River basin; 3) develop and refine indices of biological integrity for the fish and macroinvertebrate communities; and 3) investigate potential stressors to impaired aquatic life uses. This project, started in 2005, will take two years to complete. The North Dakota Department of Health will repeat this process for most of the wadeable streams statewide. This effort attains habitat quality information.

- North Dakota Wetland Bioassessment Program: The primary purpose of North Dakota's wetland bioassessment program was to develop wetland water quality standards for North Dakota. This involved developing biological community metrics and an Index of Biological Integrity (IBI) for temporary and seasonal wetlands.
  http://www.epa.gov/owow/wetlands/bawwg/case/nd.html
  http://www.epa.gov/owow/wetlands/bawwg/publicat.html

- NDGFD Wildlife Management Area Field Mapping: Beginning in 2000, the NDGFD initiated the mapping of vegetation features and managed portions of state-owned wildlife management areas in a GIS. This effort includes mapping the boundaries of fields, identifying the field status (e.g. native prairie, dense nesting cover, crop type), and activity for that year (e.g. idle, grazed, hayed, burned). This mapping effort will over time provide detailed, local level habitat status. This effort attains habitat quantity and quality information.
- Natural Heritage Inventory of Rare Communities – ND Parks and Recreation Department: The main purpose of the Natural Heritage Inventory is to identify North Dakota's natural features and establish priorities for their protection. Information from the Heritage Inventory has been used to identify high quality natural areas and potential nature preserves. The NDGFD collaborated with the Natural Heritage Program to update databases to a GIS-based system. This will allow for easy data sharing, including species information and natural areas data, between the NDGFD and other agencies. This effort attains habitat quantity and quality information.
- LIDAR – LIght Detection And Ranging: LIDAR is a remote sensing tool used primarily to collect topographic data. From an airplane in flight, a LIDAR sensor records the time difference between the emission of a laser beam and the return of the reflected laser signal to the aircraft. However, LIDAR may also be utilized to determine above-ground surface features such as vegetation structure. LIDAR data has been collected in portions of North Dakota and future efforts are being planned. This effort attains habitat quantity and quality information.

6.3.a.i Habitat Monitoring Within Landscape Components

The following is a list of the identified habitat monitoring efforts occurring within each landscape:

Tallgrass Prairie (Red River Valley)
- Four-Square-Mile Survey
- Waterfowl Breeding Population and Habitat Survey
- USFS Land and Resource Monitoring (Sheyenne National Grasslands)
- NDGFD Wildlife Management Area Field Mapping
- Natural Heritage Inventory of Rare Communities
- LIDAR

Eastern Mixed-grass Prairie (Drift Prairie)
- Four-Square-Mile Survey
- Waterfowl Breeding Population and Habitat Survey
- NDGFD Wildlife Management Area Field Mapping
- Natural Heritage Inventory of Rare Communities

Mixed-grass Prairie (Missouri Coteau)
- Four-Square-Mile Survey
- Waterfowl Breeding Population and Habitat Survey
- Ducks Unlimited - Grassland Loss of the Missouri Coteau
- NDGFD Wildlife Management Area Field Mapping
- Natural Heritage Inventory of Rare Communities

Western Mixed-grass/Shortgrass Prairie (Missouri Slope)
- Waterfowl Breeding Population and Habitat Survey
- USFS Land and Resource Monitoring (Little Missouri and Cedar River National Grasslands)
- NDGFD Wildlife Management Area Field Mapping

- Natural Heritage Inventory of Rare Communities

Planted or Tame Grassland
- Four-Square-Mile Survey
- Waterfowl Breeding Population and Habitat Survey
- NDGFD Wildlife Management Area Field Mapping
- Natural Heritage Inventory of Rare Communities

Wetlands and Lakes
- Four-Square-Mile Survey
- Waterfowl Breeding Population and Habitat Survey
- North Dakota Wetland Bioassessment Program
- NDGFD Wildlife Management Area Field Mapping
- Natural Heritage Inventory of Rare Communities
- LIDAR

Rivers, Streams and Riparian
- Waterfowl Breeding Population and Habitat Survey
- ND Forest Service: North Dakota Forest Health
- North Central Research Station's Forest Inventory and Analysis (NCFIA)
- Red River Basin Bioassessment Project
- NDGFD Wildlife Management Area Field Mapping
- Natural Heritage Inventory of Rare Communities
- LIDAR

Badlands
- Waterfowl Breeding Population and Habitat Survey
- USFS Land and Resource Monitoring (Little Missouri National Grasslands)
- Natural Heritage Inventory of Rare Communities

Upland Deciduous Forest
- ND Forest Service: North Dakota Forest Health
- North Central Research Station's Forest Inventory and Analysis (NCFIA)
- NDGFD Wildlife Management Area Field Mapping
- Natural Heritage Inventory of Rare Communities
- LIDAR

6.3.a.ii Monitoring for Statewide Changes in Habitat

A coarse-scale habitat assessment will be used to obtain an inventory of habitat in North Dakota. This inventory will be used to evaluate generalized conditions and trends in habitat on a statewide basis. When combined with the above mentioned landscape monitoring efforts, this inventory will provide a comprehensive overview of fish and wildlife habitat. A Geographic Information System provides the best opportunity to develop this coarse-scale assessment. Using a combination of habitat monitoring efforts and a standardized landcover, the NDGFD will monitor coarse-scale changes in habitat quantity and quality. Such a system requires extensive collaboration, sharing of resources and new technology. The following will occur to develop this system:

- The NDGFD will continue to maintain contact with other agencies or organizations active in creating landcovers, and encourage the sharing of spatial information.
- The NDGFD will encourage agencies/organizations involved to use landcover classifications which will satisfy the needs of all parties involved.
- The NDGFD will create a standardized landcover classification which can be systematically completed and utilized for monitoring the quantity and location of vegetation in North Dakota.
- The NDGFD will utilize new advancements in GIS technology as they become available.

6.3.b Species Monitoring

6.3.b.i Birds

Forty-five avian species are represented on North Dakota's list of SoCP. This represents the largest group of species on the list, and also some of the more commonly studied and/or monitored species. For many bird species, particularly game species, standardized monitoring has occurred for several decades. Breeding Bird Survey routes and data can be used for monitoring many SoCP. See Appendix A.1 for species specific monitoring efforts.

Existing Game Surveys

All avian game species are currently monitored adequately for the purpose of game management. Annual surveys provide breeding population estimates and/or production. There is no need to expand or add new surveys for these species at this time. The following provides examples of ongoing surveys:

- Waterfowl (SoCP include northern pintail, canvasback, and redhead):
    - Waterfowl Breeding Population and Habitat Survey, Four-square Mile Breeding Waterfowl Survey, Brood Counts, Nest Surveys (USFWS and NDGFD)
- Upland Game Birds (SoCP include sharp-tailed grouse, greater prairie-chicken and greater sage-grouse):
    - Lek Surveys, Brood Runs, Incidental Brood Reports (NDGFD)

Threatened and Endangered Species Monitoring

There are four federal threatened or endangered species on the SoCP list. These include bald eagle, whooping crane, piping plover, and least tern. The peregrine falcon was recently delisted.

- Midwinter Bald Eagle Survey. This is a national survey and the NDGFD has participated since 1986. It provides an index of wintering eagles on the Missouri River from Bismarck to Garrison Dam. The USFWS surveys portions of the Missouri River for breeding bald eagles in the spring. Due to funding constraints, the USFWS is unable to survey in some years.
- Whooping crane spring and fall migration sightings are currently coordinated with the USFWS and are adequately monitored.
- Piping plovers in the U.S. Alkali Lakes Core Area are monitored annually.
- The ACOE conducts annual monitoring of piping plovers and least terns along the Missouri River System.

Breeding Bird Survey (BBS)

The BBS has been in place since 1966. There are 45 active BBS routes in North Dakota. On average, surveys are conducted on 29 routes each year. Although the BBS has limitations and is considered by some to have significant bias, it is nonetheless the best source of long-term data for the majority of avian SoCP. There are only a handful of species the BBS does not detect well, such as the yellow rail and other secretive birds. BBS data has been used by the HAPET office to develop detailed species presence/absence models in the Prairie Pothole Region of North Dakota and by PIF to assess landbird populations and conservation priorities at national and regional levels. See http://www.pwrc.usgs.gov/bbs/ for more information on the BBS.

- The BBS is an important, if not the primary tool for monitoring population trends of many SoCP.

Shorebirds

Breeding shorebird surveys in the Prairie Pothole Region have been developed and implemented by the HAPET office. These roadside surveys were designed to maximize detection of breeding shorebirds per unit effort, monitor population trends, and provide data suitable for development of spatial models that predict shorebird occurrence with landscape characteristics. Five of the shorebird SoCP (American avocet, willet, marbled godwit, Wilson's phalarope, and upland sandpiper) are surveyed in this effort. However, the survey is not conducted south and west of the Missouri River, although several of these species do occur there, albeit in lower frequencies. Beginning in 2005, a survey on long-billed curlews will be conducted in the Missouri Slope.

Waterbirds

Currently, waterbirds are monitored at local levels, such as within a national wildlife refuge complex. No statewide, annual survey of colonial or non-colonial nesters is taking place. Beginning in 2004, a project looking at marsh bird distribution in relation to landscape composition was funded with SWG. This project, located in the Prairie Pothole Region of North Dakota, is continuing in 2005 and possibly into 2006 with the spatial extent modified to include western ND. See waterbird species accounts in Appendix A for more information.

Initial Avian Monitoring/Survey Goals

- Collate statewide information of bald eagle nests, survey for new nests, and monitor production.
- Work to ensure all 45 BBS routes are run annually, and strategically create new routes where needed.
- Assist in providing qualified individuals to assist with the HAPET shorebird survey where needed.
- Work with the NGPJV and its science coordinator to develop and implement a similar survey south and west of the Missouri River. This could be in combination with the long-billed curlew survey.
- Work with the NPPWCP for creation and implementation of colonial and non-colonial waterbird monitoring on a spatial and temporal scale.

6.3.b.ii Reptiles and Amphibians

There are two species of amphibians and nine reptiles listed as SoCP. Little effort has been applied to survey reptiles and amphibians in North Dakota. What has been conducted occurs primarily at local levels. There is no statewide monitoring effort in place. A monitoring system using presence/absence data will produce distribution trends over time. Regional coverage or land occupancy trends may be achievable, but population trends may not. See Appendix A.2 for species specific monitoring efforts.

Existing Surveys

Several small-scale surveys are ongoing or have occurred in the past several years. These include:

- USFS surveys on the Sheyenne and Little Missouri National Grasslands for amphibians.
- Theodore Roosevelt National Park conducted upland wetland and river surveys for amphibians to gather baseline data for future monitoring efforts and to evaluate changes in the distribution of species.
- University research includes local level projects, typically on targeted species.

National Surveys

Several national organizations have initiated efforts to develop standardized monitoring protocols. Once these protocols are developed and adopted as national standards, they could serve as potential monitoring schemes to consider for North Dakota.

- PARC - Partners in Amphibian and Reptile Conservation http://www.parcplace.org/
- ARMI – Amphibian Research and Monitoring Initiative http://armi.usgs.gov/index.asp
- NAAMP – North American Amphibian Monitoring Program http://www.pwrc.usgs.gov/naamp/

Initial Amphibian and Reptile Monitoring/Survey Goal

- Work with universities, agencies, volunteers, schools, etc. to implement a standardized statewide amphibian and reptile monitoring network.

6.3.b.iii Mammals

Monitoring protocol for mammals, especially small mammals, was identified as the greatest need for mammal conservation at the experts' workshop. It was agreed that a monitoring system using presence/absence data to develop trends would be the most effective means for tracking changes in small mammal distribution over time. The NDGFD has identified this as a major need in this CWCS and will continue to develop monitoring protocol. See Appendix A.3 for species specific monitoring efforts.

Existing Surveys

- Swift fox are monitored every 3-5 years by the NDGFD.
- Gray wolf sightings and incidents are monitored primarily by the USFWS.

- Black-tailed prairie dogs will be monitored every five years as stated in the North Dakota Black-tailed Prairie Dog Management Plan.
- Presence/absence of black-footed ferrets will be noted during black-tailed prairie dog surveys.
- University research includes local level projects, typically on targeted species.

Initial Mammal Monitoring/Survey Goals

- Develop a monitoring strategy for Richardson's ground squirrels.
- The NDGFD will partner and share information with various agencies where opportunities exist to best monitor mammal populations.
- The NDGFD incidental reporting system will be used to monitor many of the mammals in the state in the interim, and will be used to augment data in the future.
- The NDGFD will continue work to develop a monitoring protocol to track species within the state.
- The NDGFD will develop protocol such that future funded research may be combined with other independent studies for more robust estimates based on sample size.

6.3.b.iv Fish

North Dakota's CWCS includes 22 fish SoCP. Many of these species can be monitored by group based upon habitat needs, such as riffle stream fishes. The list also includes species that must be monitored individually due to habitat preferences (e.g. blacknose shiner) or small population (e.g. pallid sturgeon). See Appendix A.4 for species specific monitoring efforts.

Existing Surveys

- The NDGFD will survey select streams and water bodies on a yearly basis.
- The NDDH IBI stream surveys and prairie fish surveys cover substantial reaches of major rivers in the state.
- Individual species monitoring, such as for pallid sturgeon, are conducted by partnering agencies.
- NDGFD conducts annual surveys for young-of-the-year paddlefish and also tags adult paddlefish.

Initial Fish Monitoring/Survey Goals

- The NDGFD incidental reporting system will be used to augment ongoing monitoring information.

6.3.b.v Freshwater Mussels

Mollusks have not been recently inventoried within the state. Currently no long-term monitoring plan has been developed to track populations of freshwater mussels. There is a need to develop a protocol to monitor the 13 freshwater mussel species within the state. This protocol will be developed largely from a previous survey of North Dakota waters. See Appendix A.5 for species specific monitoring efforts.

Existing Surveys

- No existing annual surveys are in place.
- NDDH will gather mussel data as part of its statewide IBI program beginning in 2005.

Initial Freshwater Mussel Monitoring/Surveys Goals

- Develop a monitoring protocol to track freshwater mussel species within the state. Generally this will consist of timed searches of a particular stream reach.
- The NDGFD will use the incidental reporting system to augment other monitoring efforts.

6.4 Monitoring Conservation Actions

Understanding species response to conservation actions is crucial to program delivery. As SWG funded conservation actions are implemented, monitoring the effectiveness of the actions will be a requirement of each project. Each project will identify specific objectives, deliverables, and a plan, including the appropriate geographic scale, for how it will be monitored. Monitoring may be limited or less frequent for those conservation actions that have demonstrated beneficial effects. Conservation actions that do not meet the project's objectives will be re-evaluated. In addition to SWG funded conservation actions, partners will be encouraged to monitor conservation actions affecting species of conservation priority and associated habitat.

6.5 Databases

The NDGFD must have an avenue for storing and accessing information obtained from monitoring efforts. Databases of existing and newly obtained information will allow the NDGFD and partners to evaluate conservation actions and conservation goals based on the best available information. This will be a key component in maintaining efficient adaptability of the state's plan as we progress into the implementation phase. It will also provide enhanced accessibility and additional information to be used in revisions of the state's CWCS. There are several options for storing and obtaining spatial data and other information to support habitat and species monitoring efforts. Databases or opportunities which will be used are presented below.

6.5.a Species-Habitat Associations

Larger scale monitoring and assessment activities are focused on habitat inventories. Species habitat use or association information is the link between habitat inventory and potential species benefits or risks. Through an association database, species will be tied to habitats, and habitats back to species, at whatever levels current scientific information may support. The database link will enable both tabular and GIS summaries of habitat availability and estimated landscape carrying capacity for each modeled species. Through development of this database tool, simulation modeling will become available at the planning and implementation levels. A similar system has been designed by the Playa Lakes Joint Venture and NDGFD is participating with the Northern Great Plains Joint Venture to develop a system specific to western ND for validation of the concept.

6.5.b North Dakota GIS Hub (NDGH)

The North Dakota GIS Hub was created in 2001 as a result of widespread demand from state agencies wanting a mechanism for sharing the great amount of GIS data useful to many agencies. The mission statement of the NDGH is "The State of North Dakota's GIS Hub will provide the essential infrastructure to share core geographic datasets through an accessible data warehouse among Stakeholders with browsing ability to the general public. The Hub will leverage the State's existing data, infrastructure and expertise to implement the core elements of this enterprise solution." The NDGH provides easy and quick access to a large amount of geographic information such as: 2003 color aerial 1-meter photographs of the entire state of North Dakota; USGS 24k, 100k, and 250k topography; multiple land classifications; National Wetlands Inventory; soil data – STATSGO and SSURGO; federal and state land ownership; and roads. All of this data is available for download and can be accessed directly by NDGFD staff into a GIS program. The ND GIS Hub may be found at
http://web.apps.state.nd.us/hubexplorer/generalinfo/viewer.html

The NDGFD also maintains an extensive database of fish and wildlife information which is available only to NDGFD staff. Examples include grouse lek sites, nongame fish sampling points, black-tailed prairie dog towns, and a growing database on SoCP locations as a result of the incidental reporting system. GIS databases will continue to grow in use for storage of species and habitat information.

6.5.c The North Dakota Natural Heritage Program and Incidental Reporting System

Within North Dakota, the Natural Heritage Program for several decades has served as the state's primary repository for rare and unique species and habitat information. However, a lack of funding and other

resources has limited the effectiveness of the program with respect to data entry, retrieval and the ability of staff to network with those who carry out monitoring and survey efforts across the state. In an effort to improve that situation, the NDGFD provided the Natural Heritage Program with a state wildlife grant to upgrade its software to allow for more efficient data entry and retrieval. The NDGFD has also met with most of the previously mentioned resource agencies, university researchers, NGOs, birding clubs, etc., and emphasized the need for reporting survey information they collect on SoCP to the Heritage Program. Based on feedback received from these agencies, they also see the benefits of integrating their information into the Heritage Program's repository and will make it a priority to provide them with such data.

In addition to emphasizing the need to share information, the NDGFD initiated an incidental reporting system for the state's SoCP. The system is intended to provide members of the general public and others with an opportunity to report anecdotal observations of species of conservation priority. This information will be used to augment other monitoring efforts in an attempt to bolster knowledge of these species. The NDGFD web site currently has a link that individuals can log onto and electronically report a sighting http://www.nd.gov/gnf/gnfapps/SpeciesOfConservation/. Depending on the particular species, individuals are asked to provide information how it was observed, the location, and age structure. Each sighting is assessed for its validity and forwarded to the Heritage Program for entry into its database. Hard copies of the forms used in the incidental reporting system are also available for those without access to computers. Most of the resource agencies contacted expressed interest in having their staff use the incidental reporting system. Again, the incidental reporting system is intended only to provide additional species information to augment systematic and standardized monitoring surveys. The reporting system provides an opportunity for the public to interact in SoCP reporting and contribute to refining species distributions.

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